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Motor Control Gear

RECOMMENDATIONS OF A PRODUCTIVITY TEAM

SIMPLIFICATION and standardization for reduction of variety of types, followed by specialization by each maker in one portion only of the remaining smaller range, is one of the main recommendations of a Productivity Team which visited the United States in the autumn of 1949 to investigate the use and manufacture of electric motor control devices and small airbreak switchgear. Other recommendations of the unanimous report (published by the Anglo-American Council on Productivity, 21, Tothill Street, Westminster, S.W.1, and also obtainable from the B.E.A.M.A., 36, Kingsway, W.C.2, price 2s.) include the provision of power operated tools, the elimination of unnecessary handling by the arrangement of machines and processes and provision of mechanical assistance to reduce physical effort. The aggregate effect of detailed suggestions made in the report will, the team says, have a marked effect on the rate and the cost of production.

Scope of Study

The team studied starters and control gear of the hand operated and automatic types for motors from $\frac{1}{4}$ to 200 h.p. and airbreak switches for up to 300 A at 400 V. It does not think that there is in this country the same scope for the mass production of control gear as there is in the U.S. The population is only one-third of that of the U.S. and the electricity authority is not in a position to cope with a heavy demand for more power.

Thus the American industry has been able to simplify and standardize to a much greater degree than has been possible in this country. The reasons are: few restrictions by the electricity undertakings of permissible switch-on currents of motors; attention paid by manufacturers to the production of motors taking small switch-on currents; care taken by machinery makers and users to ensure the proper application of directly started motors; recognition of the fact that when directly started motors are used circuit protecting devices must be able to withstand the large starting current and that (to make this practicable) the usual requirements as to cable protection must be relaxed.

Export Considerations

In the U.S. the production of the direct-on magnetic starter far outstrips the sum of all other types. As a result the magnetically-operated contactor has reached a high stage of development and standardization. The team does not suggest that it is practicable to eliminate all the alternative types of starters from the British range as there is a substantial export trade in some of them; nor would it be economical for all starter makers to embark on mass production.

American designs and methods of producing airbreak switches and switchfuses did not appear to be superior to British. In general the enclosures are less substantial and possibly would not appeal to the discriminating buyer in this country. In the team's opinion their use in the U.S. is being superseded by airbreak circuit breakers made

on mass-production lines. In lines not mass-produced there is evidence of consistent efforts to embark on batch production whenever possible.

The team saw many instances of high rates of production, both in machining and assembly. In no case did it appear to be the result of undue effort, but rather of deftness, such as can only be attained if the basic design of the article lends itself to mass-production, if an uninterrupted supply of good material is available, if the range of action demanded from each operator is limited and, finally, if jigs, fixtures and tools are easy to manipulate.

When the job does not engender any sense of rhythm, but calls for conscientiousness, the team does not consider that the American workman is superior to the British. If payment by results was accompanied by an adequate supply of consumer goods at reasonable prices, the team believes that the added incentive would be reflected in increased output.

PACKAGING

Sound and attractive packaging of goods is considered essential in the United States. In this country it is recognized as a good selling medium but conditions of austerity and shortage have limited the producers' scope—even if they were desirous of approaching somewhere near the American level. In competitive export trade packaging becomes an important factor and so from this consideration alone the report of a team specializing in the subject which recently visited the United States is worth studying. It is published by the Anglo-American Council on Productivity and covers every aspect of the subject in a practical way. The report should be of interest to manufacturers of the smaller electrical appliances and accessories.

DISTRIBUTION DEVELOPMENT

Although the layout and voltage of a distribution system depend on local conditions, choice of the economically correct methods should be greatly facilitated by the logical and factual working out of basic principles in Mr. J. Henderson's address as chairman of the I.E.E. Scottish Centre. His proposals seem flexible enough to meet both immediate and long-term requirements, having regard for a sustained annual growth of demand of from 6 to 10 per cent. While voltage-drop is an over-riding consideration, the need to take into account capitalized losses as well as first cost, which he emphasizes, supports the principle that of two possible voltages the higher should be chosen, subject to the comparative cost of switchgear, which goes up more rapidly with increased rupturing capacity than with voltage.

VALLEY FILLING

We still hear criticisms of the Electricity Boards for their endeavours to encourage the expansion of the domestic cooking and water-heating load, even from domestic users themselves. Much has (rightly) been made of the power shortage but apparently it has not been brought home to the people that the shortage is at peak times. At other periods the available plant is underloaded and the supply authorities are losing revenue which they could legitimately earn. That is why, if they are to balance their accounts, they must fill in the load-curve valleys and their activities—as exemphified particularly by the Eastern and London Boards—are entirely justified.

CONSUMERS' QUESTIONS

Comment was made in our issue of 29th September upon the attitude of an " official " of the South Eastern Electricity Board who declined to give a consumer any explanation of a breakdown in the supply. We now hear from the secretary (Mr. A. L. Burnell) that this was against the Board's rules; all district managers are empowered to reply directly to Press inquiries on matters of local interest, including interruptions of supply. This is as it should be and we are glad to have Mr. Burnell's assurance.

We are still operating under restrictions owing to the dispute in the London printing industry and a reduction in the number of pages in this issue has been necessary. In asking for our readers' indulgence, we again express the hope of an early return to normal production.

Control in Generating Stations

4.—*Control Rooms and Control Boards*

By W. SZWANDER, Dipl. Ing. (Warsaw), A.M.I.Mech.E., M.I.E.E.*

WITHIN the space available it is not possible to review methodically the whole range of power station control. The choice is limited to cases which best illustrate the most modern trends.

The tendency, particularly during the war, to place the control room in some distant corner of the station site, convenient only to the switch-house, now appears to be in decline. Near accessibility to the station staff offices is essential, because it is from the control room that action is directed in emergencies; equally easy and direct access to the turbine and boiler houses must also be provided. Its control and metering connections with the former may be comparable with the number of its connections with the switch-house. The most usual position is at the side of the turbine room, opposite to the boiler house (Fig. 4) or at one end of the turbine house, in either case well isolated from the latter. There is not much to be gained in respect of overall A.R.P. security by excessively increasing the distance of the control room from the turbine room, which plan, on the contrary, would definitely interfere with the operational convenience. The trend in American practice (Fig. 5) goes even further, locating the control room half-way between the turbine and the boiler houses.

Whether the control of switchgear or of thermal plant is concerned, the control room is a centre of remote indication, supervision and control and as such it is a supplement to, and never should be regarded as a substitute for, local controls. Means should always be provided that will permit satisfactory local control of all plant in case the control room goes out of action, whatever may be the reason.

*Chief Technical Assistant, Belfast Corporation Electricity Department. Parts I, II and III appeared in the *Electrical Review* of 11th and 25th August and 22nd September.

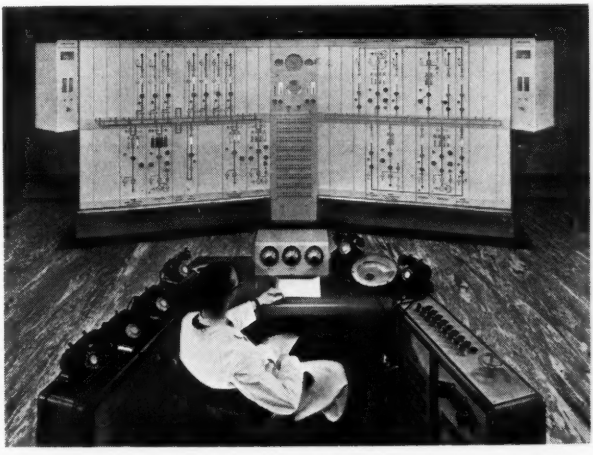


Fig. 19.—Example of miniature-type control room equipment in a modern British generating station. (A. Reyrolle & Co., Ltd.)

This requirement is satisfied in respect of thermal plant by the provision of local individual turbine and boiler gauge boards. Local panels in individual switch-houses could also advantageously be provided with proper arrangements for changing over from remote to local control.

One of the consequences of the above-mentioned requirement is the desirability of keeping away from the central control room the field rheostats of the generators and the automatic voltage regulators (mounting them on, or adjacent to, the turbine gauge boards) with provision for remote operation and control from the control room generator panels. Further, the widely accepted practice of having the switchgear protective relays in the control room is also in contradiction with the principle of independence of local and centralized operation. Correct location of relays would be on the switchgear itself, or, better for many reasons, on the local panels adjacent to switchgear. For convenience of central operation, an annunciator system indicating in the control room the operation of individual relays may be provided.

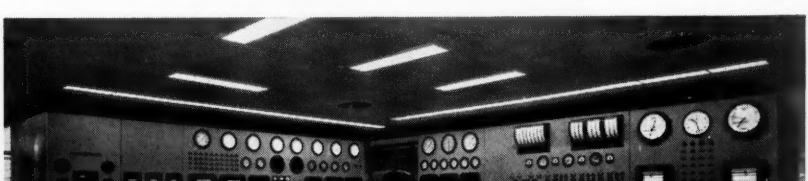
It is usual to provide a separate mimic diagram for supervision of auxiliary power distribution with means for remote switching to afford alternative supplies in emergencies and when the auxiliary system requires a change of source during the starting of main sets. Due to their importance, the auxiliary power panels should be given a rather prominent position in the control room.

Only essential indications and controls should be accommodated in the field of vision of the operator. The modern control room (Figs. 1, 3, 7, 12, 19) is very simple in appearance compared with its predecessors of older times. However, a number of recorders, meters, etc., should preferably also be easily accessible from the control room for the purpose of preparing reports and statistics, as well as for the supervision of plant components not requiring continuous attention. For this purpose a convenient arrangement is a corridor type (Figs. 8 & 21) with the panels facing towards the centre of the room carrying the essential instruments, whereas on those facing the walls is all the remaining equipment (including protective relays, automatic voltage regulators, etc., when those are not moved away from the control room as previously suggested).

The order of importance to be ascribed in the control room to the various circuits is as follows: the power generating units, interconnectors with the system or other power stations, the station auxiliary power supplies and outgoing feeders for local distribution. Some form of mimic diagram in the control room is nowadays the rule. Another highly desirable piece of equipment is a summating wattmeter giving the total station load; also when the station works in parallel with others the total system load should be directly indicated, if means for telemetering are available.

Controls which are in continuous use should be accessibly mounted in a kind of desk surrounding the operator's chair, including thermal plant controls, if provided. The generator instrument panels would then

Fig. 20.—Turbine control panel (left) and boiler control panel (right) in a sound-proof and air-conditioned central operating room of a modern American station (location indicated on the plan in Fig. 5) with window in the corner affording view of the turbine room



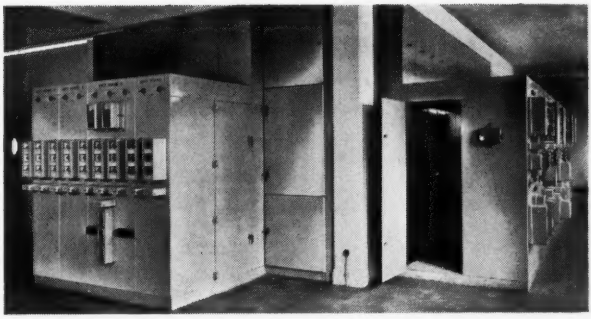


Fig. 21.—Arrangement of relay and voltage regulator panels at the back of central control room panels, showing the "corridor" type layout; back view of panels illustrated in Fig. 3. (General Electric Co., Ltd.)

also carry the respective parts of the turbine and boiler indicating instruments. An alternative is to split the control room into two parts, one containing the mechanical and the other the electrical panels and desks. On the backs of the panels carrying the boiler and turbine instruments could be meters, recorders, etc., instead of assembling them in a separate room or adjacent to boilers and turbines.

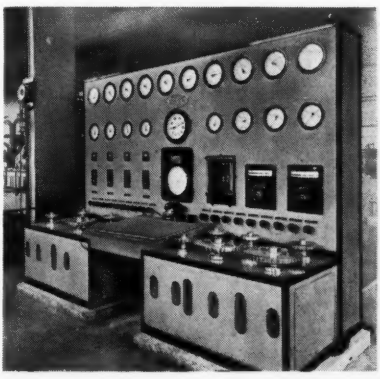
A mimic diagram on the thermal side of the room could have indicators of steam and water valve positions. Counterparts to the electrical auxiliary boards would be mimic diagrams indicating operational conditions of the c.w. feed systems, both of which might include remote controls for the respective pumps. Coal, ash, grit and soot handling controls need not be brought into the central control room since their storage capacities make them non-continuous in operation.

Turbine control boards, a better name than gauge boards (Figs. 2, 9, 22, 23) in addition to the usual gauges, should be provided with electrical instruments indicating the load and the voltage of the main a.c. and excitation circuits as well as the field controlling rheostat, voltage regulator, etc. Telephone or other type of communication with the local switchgear control panel (adjacent to the switchboard) will enable synchronizing and coupling to the busbars to be done from that local panel, should the main control room be out of action.

It appears justifiable to centralize to a larger extent on the turbine board the control of various turbo-generator auxiliaries (Fig. 23) which are now often controlled from a multitude of points (generator fans, extraction pumps, oil pumps, drain pumps, lift pumps, even c.w. pumps and, in "unit type" arrangements, the b.f. pumps should be considered in this connection). At least an indication of the operation of all the essential auxiliary motors should always be provided on the turbine control board while some instruments and alarms (*e.g.*, stator winding temperature) should also not be mounted outside the main control board.

In respect of centralization of control, boiler boards are at present in general much more advanced. Cost may delay the suggested development, but it does not appear that the usual objections raised against the principle of centralization itself should carry much weight in this case. It is true that the danger of the turbine control boards becoming too complicated may be

Fig. 22.—A modern design of turbine gauge board incorporating manual valve drives. (General Electric Co., Ltd.)



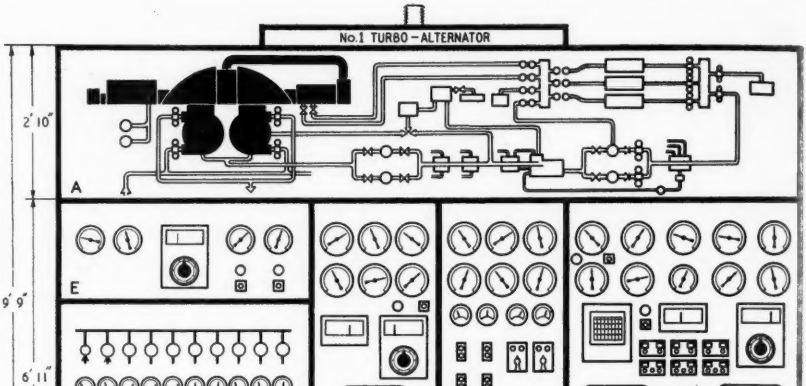


Fig. 23.—A functional design of turbine control board : (A) mimic representation of main steam, condensate, feed-water and circulating-water circuits with luminous valve-position indicators and indications of auxiliary motor operation ; (B) instruments and controls associated with steam flow ; (C) instruments indicating condenser performance and associated controls ; (D) feed-water flow controls and instruments, including remote valve controls ; (E) instruments associated with generator operation ; (F) remote controls for " unit " auxiliary switchboard

quite serious. The remedy, however, is to follow the principles already outlined for control room design: the essential and continuously used instruments and controls must be segregated from the rest and made easily and conveniently accessible to the operator, while the remaining items should be arranged in a logical, functional (rather than symmetrical, or " aesthetical ") order. The turbine operator should be able to perform the largest possible part of his duties from the front of the control board. A corridor type with an internal service passage, as illustrated before, would appear to be appropriate, with instruments and apparatus requiring less attendance mounted at the back of the board (voltage regulator, all gauges read only once every half-hour, etc.) A modern turbine control board (Fig. 23) has a mimic diagram at the top of the panel, showing steam and feed-water circuits with valve position indication. The panel itself is divided into five distinct parts, respectively comprising all the instruments, controls, indications, etc., for the alternator, unit auxiliaries, turbine, condenser, feed-water. One way of relieving congestion on turbine boards is to remove as many as possible of the recording instruments and integrating meters, which are not essential for actual operation, to a separate room (or to the back panels of a central thermal control room).

Most of what has been said about turbine control boards will equally apply to boiler boards. The large majority of boiler auxiliary controls are centralized (Figs. 6, 10, 13, 24) on boards which are acquiring large dimensions, and difficulty has arisen in finding room to accommodate them in the firing aisle, particularly in the cases of stoker-fired boilers and of the double-row arrangement. A remedy would be, first, to transfer from the boiler board to a recorder room, or to a central thermal control room, as many as possible

of the instruments which are not indispensable to satisfactory local operation and, secondly, to split the boiler board into two parts: one for essential instruments, alarms and controls used continuously and the other for items which must be quickly accessible from the front of the boiler, but do not require continuous supervision (controls of soot-blowers and precipitators, of the automatic apparatus, of remotely operated steam valves, etc.) at the back or side of the boiler, or even on a gallery above the firing aisle.

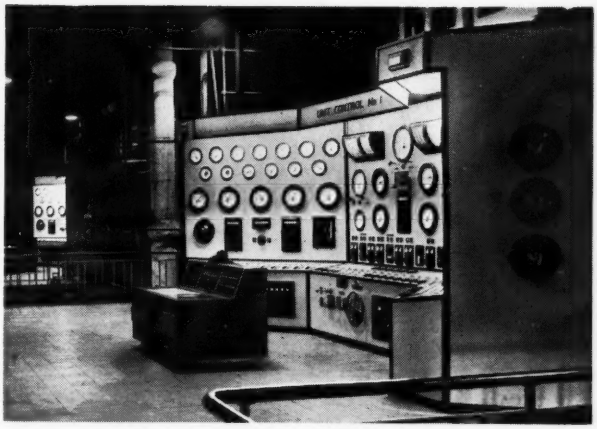


Fig. 25.—A row of "unit" control boards, each controlling a 30 MW set and an associated boiler, located between the boiler and the turbine room. (Bailey Meters and Controls, Ltd.)

When the turbine and boiler boards are combined to constitute one "unit" control board the dangers of congestion, excessive dimensions and of lack of clarity are more pronounced. Thus the need becomes even greater to transfer elsewhere all that is not absolutely necessary on the "unit" board and to arrange the rest in a strictly functional manner. In typical examples (Figs. 14 and 25) space limitation usually is not the decisive factor, hence here again the corridor-type arrangement and the use of both the front and back of the boards appear to be advisable. The arrangement side by side of boiler and turbine boards, as in the central control rooms of some American stations (Figs. 18,

Fig. 24.—Example of a boiler control board incorporating remote auxiliary motor controls together with automatic boiler control equipment

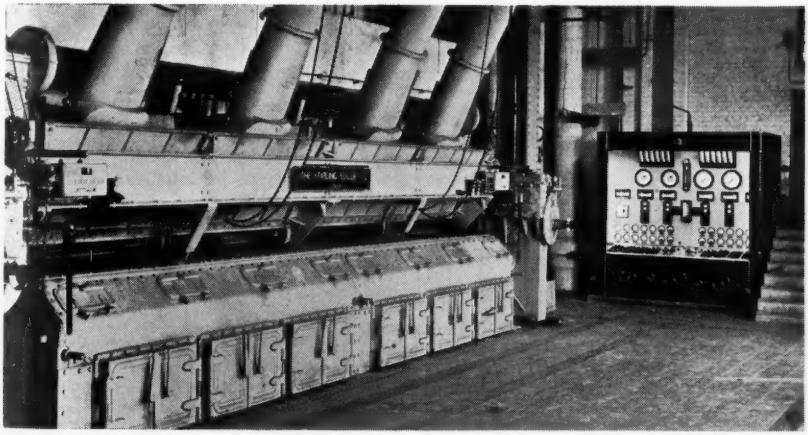


Fig. 26.—Three boiler feed pump control panels with facilities for remote motor starting and instruments for indication, recording and integration of the feed-water flow

20), is also a form of the "unit" board principle.

Acceptance of the principle of centralization of controls throughout does not mean, of course, assembling indiscriminately all of them in the station central control room. On the contrary only such controls should be brought into that room which are consistent with its functional purpose. Even outside the main control room, however, the principle of centralization still applies, tending to group (Fig. 26) functionally the controls of various types of auxiliary drives at as few points as possible—in places chosen with regard for convenience of operation. Examples are the control of ash- and coal-handling, c.w. systems with centralized pumps, dust-extraction, water treatment, lighting, heating, ventilation, drainage, etc.

The modern concept of generating station control finds its expression, not in such details, but rather in the skilful planning of all controls in mutual relationship from the viewpoint of functional interdependence of services and devices.

The author thanks Mr. W. J. McC. Girvan, city electrical engineer and general manager, Electricity Department, Belfast, for permission to publish this series of articles and acknowledges the assistance of the British Electricity Authority and manufacturers.

Rope Parting Machine

A WIRE rope parting machine announced by British Insulated Callender's Cables, Ltd., tapers and seals rope ends ready for threading through pulley blocks and subsequent clamping, so obviating end-fraying and conventional binding.

The machine is suitable for steel and hemp cored ropes of from $\frac{3}{8}$ to $\frac{7}{8}$in diameter, or occasionally up to $1\frac{1}{8}$in diameter. After presetting, the rope is clamped in contact grips through which a heavy electric current at low voltage is passed to render a portion of the wire rope malleable. In the initial stage, the rope is twisted to bring all the strands into close contact with one another and to ensure uniform heating throughout. The rope is then stretched until a pronounced waisted effect is obtained. The effect of burning through is to allow the molten metal to weld the ends of the wires together, forming a seal which prevents strands unlaying.

The machine, which is mains energized, measures 2ft 9in by 4ft 8in by 4ft 2in high and is mounted on four wheels. The clamping heads are of cast copper alloy, in the form of slotted three-jaw chucks, which enable the rope to be *laid* in the machine, so avoiding a long reeling-through operation. Two of the jaws on each head can be pre-set to accommodate the size of rope to be parted and are fitted with indicating scales. The third jaw is clamped hard on to the rope by a special box spanner.

The torsion head can be rotated about its axis by a hand-wheel to twist the rope and the tension head is travelled longitudinally by a hand-wheel and screwed spindle. This spindle is slotted along its length and forms part of a trough which leads to the centre of the clamping heads, in which the rope is laid. The outer ends of the trough are bell-mouthed to avoid damage to the rope.

The gap between the heads varies from $1\frac{1}{2}$ to $7\frac{1}{2}$in, as indicated on the scale, the maximum working range being from $1\frac{1}{2}$ to $5\frac{1}{2}$in. The initial setting is determined by the size of rope and length of taper required.

The length of time for which the current is switched on depends upon the size of the wire rope to be parted. It varies from about 45 seconds for a $\frac{3}{8}$in diameter rope to 2 minutes for a 1in diameter rope. These times compare with between 12 and 20 minutes required for the parting process at present in general use.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Railway Executive announces that **Mr. S. B. Warder,** M.I.Mech.E., M.I.E.E., M.Amer.I.E.E., mechanical and electrical engineer, Southern Region, has been appointed chief officer (electrical engineering), Railway Executive Headquarters, in succession to Mr. C. M. Cock, who was recently appointed manager of the Traction Department of the English Electric Co., Ltd. and a director of the English Electric Export and Trading Co., Ltd. Mr. Warder was educated at Glasgow High School and London University. He joined the Southern Railway in 1936 as technical assistant to the electrical engineer for new works, being appointed new works assistant to the chief electrical engineer in 1943 and assistant to the chief electrical engineer in 1947. Upon the nationalization of the railways he became electrical engineer, Southern Region, and in 1949 mechanical and electrical engineer for the same Region.

Mr. Leslie Gamage, vice-chairman and joint managing director of the General Electric Co., Ltd., accompanied by the Hon. Mrs. Leslie Gamage, left Liverpool on 3rd October in the liner *Empress of Scotland* for a five weeks' business trip to Canada. Mr. Gamage, plans to visit Quebec, Montreal and Vancouver. On 30th October he will deliver an address to the Canadian Club, Montreal, on "Britain's Industrial Recovery," which will be broadcast throughout Canada.

Mr. H. E. Ridley, cable representative of St. Helens Cable and Rubber Co., Ltd., in the Yorkshire area, is due to retire after thirty-one years' service. His successor is **Mr. G. H. Hirst,** who assumed the management of the Bradford office on 3rd October. Mr. Ridley will continue his service on a temporary basis.

The B.E.A. Southern Division has announced the appointment of **Mr. S. C. Irving,** A.M.I.E.E., station superintendent at Hounslow generating station, to the position of assistant station superintendent, Poole.

Mr. J. deGruchy has been appointed head of the Instrument Department of the Electrical Apparatus Co., Ltd.

Mr. J. E. I. Gaymer, A.M.I.E.E., M.E.I.C., recently co-ordinating engineer with Mr. Ranald J. Harvey, consulting engineer to the New Zealand Government, has been appointed works manager of Pyrotenax, Ltd.

Mr. H. Copping, M.I.E.E., is joining Newman Industries, Ltd., on 1st November, as general sales manager of the electrical equipment division at Yate, nr. Bristol. Mr. Copping, who was formerly with George Ellison, Ltd., is a past chairman of the Utilization Group of the North Midland Centre of the I.E.E. **Mr. E. A. Parr-Dudley,** A.M.I.E.E., will continue to operate as the London sales manager of the electric equipment division.

Mr. W. S. Steel, B.Sc. (Eng.), M.I.E.E., A.M.Inst.Mar.E., has been elected a director of the British Thomson-Houston Co., Ltd. He was born and educated in South Africa, graduated at the Witwatersrand University in mechanical and electrical engineering and subsequently joined the B.T.H. Co. as a student apprentice at Rugby. In 1937, he went to South Africa as engineering representative of the company. Returning to this country in 1940, he held technical appointments in the Ministry of Labour and National Service, afterwards becoming Regional Controller, Ministry of Supply, in Wales. He returned to the B.T.H. Co. in 1943 to take

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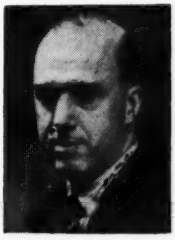


Mr. L. Drucquer

Mr. P. E. Gaze

over Admiralty work in the Marine Department, and became manager of that Department in 1944. In 1946 he was appointed manager, B.T.H. Home Sales, and was elected a director of the British Thomson-Houston Export Co. in 1948. Mr. Steel is a vice-chairman of the I.E.E. Rugby Sub-Centre.

Mr. L. C. Richards, B.Sc.Tech., M.I.E.E., has been appointed chief engineer, Transformer Department, of the Metropolitan-Vickers Electrical Co., Ltd., from 1st October. He succeeds **Mr. A. G. Ellis,** who after 32 years as chief engineer now takes up the position of consultant to the Department.

Mr. R. M. Watts has been appointed superintendent, Steel Products Department (Trafford Park and Stockton Works) of Metropolitan-Vickers in succession to **Mr. T. Dooley,** who has been transferred to the Hotpoint Electric Appliance Co., Ltd.

Mr. A. W. Barford, who was commercial engineer, B.T.H. London district office, is now in Egypt, having been appointed manager of the Cairo office of the British Thomson-Houston Export Co. Ltd. Mr. Barford was a B.T.H. apprentice and a student at the Rugby Technical College.

To celebrate the 77th birthday of **Mr. F. Hill-Cole,** director of Truvox Engineering Co. Ltd., Mr. E. Spier recently gave a luncheon at the Dorchester Hotel, London, for nearly forty guests.

Owing to pressure of professional and private business, **Mr. W. A. M. Allan,** A.C.G.I., M.Inst.C.E., who has held the position of hon. secretary to the Engineers' Guild for the past eleven years, relinquished his appointment at the end of last month. Mr. Allan is an assistant divisional engineer with the London County Council. In his stead the General Council has appointed **Mr. J. H. W. Turner,** B.Sc.(Econ.), B.Sc., A.M.Inst.C.E., who has been the hon. editor of the Guild's journal and a member of Council since 1946. He continues as editor of the journal.

Mr. R. R. Coventry has been appointed sales manager of the Stella Lamp Co., Ltd. He has assumed his duties at the company's new sales administrative offices at 37-39, Oxford Street, W.1. Before joining the Stella Co. he was for twelve years with Thorn Electrical Industries, Ltd.

Mr. L. Drucquer, M.I.E.E., has been appointed manager, home sales (plant and apparatus) of the British Thomson-Houston Co., Ltd., as from 2nd October. He received his general education at the Haberdashers' Askes School, and his early technical training at the Polytechnic Engineering College, London, being awarded a gold diploma for electrical and mechanical engineering. He joined the B.T.H. Test Department in 1920 and was subsequently with the outside construction staff, being transferred in 1925 to the Switchgear Sales Department of which he was appointed assistant manager in 1939 and manager in 1945.

The successor to Mr. Drucquer as manager, B.T.H. Switchgear Sales Department, Willesden, is **Mr. P. E. Gaze,** B.A., A.M.I.E.E. Mr. Gaze was personal assistant to Mr. Drucquer from 1947 until 1949, when he was appointed assistant manager of the Department, in which he had been sales engineer since 1935. He was educated at Felstead School and Trinity College, Cambridge, where he gained second class honours, mechanical science tripos. He served a student apprenticeship at the B.T.H. Rugby Works.

The Faraday House Gold Medal has been awarded to **Mr. R. P. R. Hunt,** as the best all-round student of the final term of his group. Mr. Hunt is a graduate apprentice who joined the Brush Electrical Engineering Co., Ltd., Loughborough, after completing his Faraday House diploma course.

Mr. J. S. Warren (E.M.I. Sales & Service Ltd.) has been elected chairman of the B.E.A.M.A. Domestic Electrical Appliances Section in succession to the late Mr. F. G. Nesbitt. **Mr. F. L. Humber** (Ferranti, Ltd.) has been elected vice-chairman. Mr. Warren, who joined the Gramophone Co. Ltd. as sales manager for H.M.V. Household Appliances in 1944, has been connected with this branch of the electrical industry over twenty years.

The new United States Ambassador to Great Britain, **Mr. W. S. Gifford,** was until recently president of the American Telephone & Telegraph Corporation.

An enjoyable evening was spent by 120 members and friends of the **Sloan Electrical Co.'s Social Club** at their first dance of the Season, held at the Royal Hotel, Russell Square, on 24th September.

Mr. G. E. Taylor, A.M.I.E.E., has been appointed technical investigation officer (electrical) to London Transport, responsible to the electrical engineer for all technical investigations and development, including the work of the testing section. Mr. Taylor started his career as pupil and junior engineer with the

Newcastle-on-Tyne Electric Supply Co. and joined the Metropolitan Railway in 1919 and rose to sub-station and supplies engineer, a position he now relinquishes.

Mr. L. A. M. Ginger, A.M.I.E.E., has been appointed assistant electrical engineer (outdoor), London Transport, responsible to the electrical engineer for the co-ordination of the operation and maintenance of the generating stations, sub-stations, h.v. mains and distribution sections of the electric power supply system. Mr. Ginger received his education and technical training at the Regent Street Polytechnic and with the B.T.H. Co. Before joining London Transport he was assistant for sub-stations and cables in the office of the electrical engineer, new works and development, Railway Executive, and was largely responsible for the design and layout of the sub-stations and distribution systems for the Liverpool Street to Shenfield, and the Manchester-Sheffield-Wath electrification schemes.

Mr. M. Solomon, F.C.G.I., M.I.E.E., is retiring from the board of the General Electric Co., Ltd., on account of continued ill-health. Mr. Solomon was a scholar of St. Paul's, from which he obtained a Clothworkers' scholarship to enter the City and Guilds Central Technical College. After a short period with Johnson Matthey & Co. and the Nernst Lamp Co., during which he met the late Lord Hirst, then Mr. Hirst, he joined the General Electric Co., Ltd., in 1903 to work in the experimental department of the Robertson Lamp Works. In 1904 he was transferred to Witton as works manager of the Carbon Works, and became general manager of these works at the end of the following year. Mr. Solomon was appointed a director of the G.E.C. in 1915 and in 1920 became managing director of Pirelli-General Cable Works, Ltd., a post which he held till 1928 when he relinquished it but remained on the board. He was chairman of the Cable Makers' Association in 1929 and 1936.

Mr. C. E. D. Catley has been appointed personal assistant to Mr. J. Bowthorpe, managing director of the Bowthorpe Electric Co. Ltd.

The annual golf meeting of the **G.E.C. Golfing Society** was held at Sonning Golf Club on 16th September. There were fifty-four competitors and the prize winners included Mr. J. Gaskin, Lemington Glass Works (Hugo Hirst trophy); Mr. G. Plant, Pirelli-General Cable Works, Southampton (veterans' cup); Mr. R. E. Robinson, Telephone Works, Coventry (Australia cup for senior veterans); Mr. C. F. Boyes, Sales Department, head office (Robinson-Rhodesia tankard); and Mr. A. Jacob, Fraser & Chalmers, Erith (morning medal competition). Prizes were also gained by Messrs. C. Boyes and A. T. Bridge, and Messrs. W. J. Bird and F. Sampson, winners and runners up, respectively, in the afternoon four ball competition. At the conclusion of the day's play prizes were presented by the Hon. Mrs. Leslie Gamage. During the evening Mr. E. Silberman took the chair at the annual dinner of the Society and presented Mr. F. Farthing, the Society's hon. secretary, with a box of golf balls in recognition of his services.

Mr. C. Croom-Johnson, M.C., T.D., has joined the home sales organization of Enfield Cables, Ltd. He has recently returned after service overseas with the Army, and latterly under the Foreign Office. The following have been appointed branch managers :—Messrs. E. Evans (Cardiff branch), C. Wood (Hull branch) and B. Smith (Brighton branch). Mr. S. J. Murrey, who was branch manager at Brighton, has been transferred to the new branch at Southampton.

Thorn Electrical Industries, Ltd., announce the appointment of **Mr. C. B. Styles** as senior lighting engineer at their northern branch, Manchester. Mr. Styles was for many years with the G.E.C. at Hull.

Parsons Memorial Window

A MEMORIAL window designed by Sir Ninian Comper, to commemorate Sir Charles Parsons, O.M., F.R.S., who died in 1931, was dedicated in Westminster Abbey by the Dean on 5th October. Viscount Hall, First Lord of the Admiralty, represented the Royal Navy and, in addition to many Fellows of the Royal Society, there were representatives of the British Electricity Authority, the Mercantile Marine, the Corporation of Newcastle, the Royal Society of Arts, the Royal Institution, the British Association for the Advancement of Science and industrial concerns with which Sir Charles was associated. Twenty-seven members of the Parsons family were also present.

In an oration, Sir Frank Smith, chairman of the Royal Society's Memorial Committee, spoke of Sir Charles as a great gentleman, a great scientist and, in the judgment of many, the greatest steam engineer the world had known. In a survey of Sir Charles Parsons' many activities, Sir Frank Smith said that in 1880, Parsons completed the first turbo-electric generator in the world, and a few years later turbo-generators were supplied to Newcastle.

Sir Frank also spoke of Parsons' first steam turbine vessel which " charged down the line of cruisers and battleships at what must have been an amazing speed of 30 knots " at the Royal Naval Review at Spithead in honour of Queen Victoria's Diamond Jubilee. Turning to Parsons' other pursuits Sir Frank Smith listed his experiments with rockets to propel torpedoes, a loud speaker for use at concerts, model flying machines, searchlight mirrors and attempts to produce diamonds.

Network Planning

Securing Flexibility and Economy

THE principles on which the development of electricity supply networks should be planned were outlined, with the aid of graphs and circuit diagrams, by Mr. J. Henderson (chief engineer, South West Scotland Electricity Board) in his address as chairman of the Scottish Centre (Glasgow) of the Institution of Electrical Engineers.

Mr. Henderson said that, assuming the persistence of a.c. at 50 c/s and 132 kV with 415 V three-phase and 240 V single-phase terminations, reasons of economy and system flexibility pointed to the need for two intermediate voltages. A long-term policy to standardize 11 and 33 kV for this purpose merited serious consideration in order to avoid excessive expenditure on switchgear and cables.

Comparison of the costs of transmission showed that for loads below 10 MVA, 11 kV was economical over a distance of approximately 4 miles while for greater loads 33 kV was preferable up to at least 10 miles. For each step of 20 MVA an additional 33 kV line was required, whereas at 132 kV loads up to 90 MVA could be carried without additional reinforcement up to approximately 40 miles at 0.9 power factor. It was important to include line and transformer losses in the comparison.

If rupturing duty could be held down below 250 MVA at 11 kV and to 750 MVA at 33 kV, the cost of switchgear might be greatly reduced. To use such low ratings as maximum values it might be necessary to increase the reactance of the transformers through which supply was given. Although they would be more expensive, it seemed probable that (to improve network design and lower costs) the use of high reactance transformers would become general in future. As load density increased their use would become essential, with external reactance as the alternative.

Voltage Regulation

Ring main systems of distribution were preferable, or transformer feeder arrangements ultimately developing into ring main systems. Medium voltage networks must be designed to maintain voltage regulation within the statutory limits and voltage drop should not place a limit on line loading. Correct network design would do away with the necessity for transformer taps on distribution transformers. To improve voltage regulation the h.v. supply should be taken as near the point of supply as possible.

If sufficient 11 kV/415 V sub-stations were provided to enable distribution feeders not greater than 0.1 or 0.2 sq in to be used, the distribution cost would be the minimum and average £40 per service. If the ultimate loading represented an average after-diversity demand of 2 kW per service, an 11 kV substation would be required for every 400 houses and none of the distributors would be longer than 250 yd. If the supply were extended to a greater area the use of 0.3 sq in feeders might become essential and the cost per service greatly increased.

In rural areas the backbone should be three-phase at 11 kV, but the majority of spur lines should be single-phase; for all distances over 250 yards an 11 kV single-phase spur line was the cheapest to erect and the longest over which an l.v. supply should be given in order to maintain good voltage regulation. Unless, therefore, farms and rural premises were within 500 yd of each other and could be supplied by l.v. lines not greatly in excess of 250 yd, the h.v. should be taken as near the point of delivery as possible. The average cost of giving supplies to farms in rural districts was of the order of £400.

Overhead Line Inspection

TWO Diesel driven vehicles of a special design have recently been delivered to the Eastern Region, British Railways, by the Drewry Car Co., Ltd., for inspection and maintenance work on the overhead line equipment of the Liverpool Street—Shenfield, and the Manchester—Sheffield—Wath electrified lines. The vehicles will be used mainly when the 1,500 V power is off and, to allow for thorough inspection of the overhead line equipment, the vehicles can travel at 1·5 m.p.h. Inspection can be carried out from the interior of the vehicle and universally mounted searchlights allow light to be directed on any part of the overhead equipment. Floodlights are carried.

A hydraulically-operated tower is housed in a well in the vehicle body, and can be raised to any convenient height and light extending ladders are secured to the exterior of the vehicle. Spotlights can be plugged into sockets on the tower platform and fixed to the handrails. The roofs are flat and can be used as a working platform.

The interior of the vehicle provides space for up to eight men including the driver. A fitted work bench is provided; a large locker contain. bulky stores and equipment, and rails are mounted on the tower well to carry chain blocks,

I.E.E. Presidential Address

Developments in Telecommunications

THERE was a large attendance at the inaugural meeting of the 1950–51 session of the Institution of Electrical Engineers in London last week, including a number of members and representatives of the Institution from overseas.

After the presentation of the certificate of honorary membership to Prof. E. W. Marchant, premiums awarded for papers submitted last session were presented, an unusual number going to authors overseas; prizes for students who had distinguished themselves in the H.N.C. examinations were also presented.

Then came the inaugural address of Sir Archibald J. Gill, assistant director-general (engineering) and engineer-in-chief, G.P.O., the fifth member to graduate to I.E.E. presidency through chairmanship of the Radio Section. Following the same theme as his predecessors in office, Sir Archibald outlined some of the more recent developments in telecommunication engineering, thereby bringing the subject more or less up to date.

Automatic Switching

He dealt mostly with the telephone system, by far the largest of the P.O. services, mentioning that the capital investment in distribution (local-line cables) was 40 per cent of the total capital cost of the telephone system. From means of reducing that cost by cheapening construction and using one pair of conductors to serve several subscribers, the president turned to automatic switching. There were 182 auto-exchanges in London, 134 of the large director type, with a further 3 919 in the provinces; together they served 3·6 million "stations". Although the number served by manual exchanges remained at 1.5 million, auto-exchanges now served 70 per cent of the total.

The Strowger step-by-step system with the notable addition of the auto-director and other technical features, specially evolved in London for large cities, had fulfilled every demand made upon it. If a similar decision had to be made to-day, the choice would probably be the same as it had been twenty-five years ago. The system was neither obsolete or even obsolescent and would satisfy all needs until something entirely novel appeared. For example, a two-digit electronic director had already been designed and tested; samples were at present being made for trial in actual service and the possibility of obtaining miniature valves of the requisite long life no longer seemed remote.

Trunk Mechanization

Recent British developments in signalling were mentioned as well as a new cordless switchboard with key-controlled connecting circuits in place of jacks. Engineering arrangements were so planned as not to prejudice the possible long-term project of trunk mechanization for ultimate country-wide dialling with national numbering. It was too soon to say whether such a scheme would be adopted, for many administrative problems remained to be resolved.

Probably the most rapid advances in recent years had been in connection with long-distance transmission, made possible by the negative feedback amplifier (degeneration) and the concentric (coaxial) cable. Most of the original systems had recently been successfully altered to double their capacity by adding a second group of speech channels occupying a higher frequency band. The replacement, with minimum disturbance of working circuits, of the original amplifiers by new ones for the additional frequency range had been very difficult.

The first application of the new international standard requirements happened to be to the television cable link between Birmingham and Manchester, with a new type of line amplifier and terminal equipment, as well as between London and South Wales. The P.O. planned to use the video signal for modulating a 1 Mc/s carrier, the upper sideband extending to 4 Mc/s while a vestigial lower sideband, extending down to 0·5 Mc/s, would be transmitted.

The London-Birmingham cable was one of the most interesting coaxials laid in recent years; it was a triumph for British manufacturers. Two of the conductor tubes

within this cable were of special construction, capable of conveying the highest definition likely to be required either in black and white or in colour. Sir Archibald described and illustrated this cable in some detail and demonstrated its capability by transmitting pictures (provided by the B.B.C. from Alexandra Palace) to Birmingham and back again for viewing on television screens in the I.E.E. lecture theatre. The pictures travelled at a rate very slightly below the speed of light, the distance of 253 miles being the longest over which television had so far been transmitted anywhere.

The address concluded with references to submarine cables and to the remarkable growth of the overseas radio-telephone services. On the eight London–New York circuits calls averaged 1,600 weekly and were increasing at the rate of 200/week/annum; on the remaining 30 circuits calls averaged 1,700 weekly and were increasing at the rate of 300/week/annum; at Christmas time the traffic increased by 50 per cent. New sites had been secured for new sending and receiving stations and contracts for much additional plant had been placed.

New Lighting Schemes

MORE than 120 new mercury vapour lamps on the SEDGLEY section of the Dudley-Wolverhampton road were recently switched on by the chairman of the Sedgley Council (Councillor J. Fellows). The scheme has cost about £6,000.

In 1946 an experimental scheme of ten 140 W sodium units was completed in the Market Place, WOKINGHAM. In view of the improved lighting from this initial installation it was decided to proceed with the re-lighting of the whole borough with sodium units, over a period of years. The accompanying photograph illustrates a recently completed section, for which "Golden Ray" lanterns supplied by the Engineering and Lighting Equipment Co., Ltd., using Philips SO/H 140 W sodium lamps, were mounted on columns supplied by Stanton Ironworks Co., in a special buff finish to blend with the old houses in the borough. The lamps are controlled by Sangamo Weston time switches. Erection and wiring were carried out by Erecon, Ltd., assisted by the staff of the Council's Lighting Department.

Sodium lighting in a section of the Reading-Ascot road at Wokingham

E.I.B.A. Golf Championship

THE finals of the Electrical Industries National Golf Championship, in aid of the Electrical Industries Benevolent Association, were held at Addington Golf Club on 26th September. Over forty competitors from all parts of the British Isles took part. In addition to the finals there were other competitions. The following were the winners:—Championship finals: Sir Montague Hughman trophy, Mr. J. S. Davies (contractor). Championship runner-up (J. L. Wilson trophy): Mr. A. F. Trinder (Gurney's, Southall, Middlesex). Mr. A. G. Richards tied with Mr. Trinder but lost on the second line holes. Best scratch score (J. Y. Fletcher trophy): Mr. A. Clarke (H. Clarke & Co. (Manchester)). Veterans' trophy (*Electrician* salver): Mr. J. E. Hardy (North Western Division, B.E.A.). Foursomes trophy (Sir Felix Pole): Messrs. J. Ferguson (James Howden & Co. (Lond.), Ltd.), and E. C. Bachelor (South Wales Division, B.E.A.), all square. Visitors' bowl (Electrical Wholesalers' Federation): Mr. S. R. Gee (Henley's). Personal awards of tankards were made by the following members of the National Committee: Sir Henry Self, Messrs. E. C. Holroyde, H. J. Stone, A. B. Wildsmith, D. H. Melhuish, W. D. Taylor and W. Lewis Smith. The trophies were presented by Sir Henry Self at a dinner which followed, and Mr. E.C. Holroyde, president of the [E.I.B.A. spoke briefly. Sir Montague Hughman was unable to attend owing to indisposition.

Commerce and Industry

Modern Laundry Equipment

Berlin Television Demonstration

NEW and improved methods of electrical control are features of many of the appliances which were on view at the recent Laundry, Dry Cleaning & Allied Trades' Exhibition at Olympia, London, electronic devices being employed in some cases to govern the sequence of washing operations. In addition to all types and sizes of electrically-operated washing machines, tumblers, hydro-extractors, drying machines, calenders, ironers, "glad-irons," marking machines, etc., employed in laundries, apparatus for other branches of the cleaning industry was well in evidence.

Equipment for dealing with carpets was particularly well represented. Apart from vacuum cleaning plant (shown by Tellus and Sturtevant Engineering) there was the new "Flail" carpet beater, the makers of which, G. Holloway & Son (Engineers), Ltd., also showed their "Swift" carpet shampooing apparatus. Carpet cleaning was demonstrated, too, by Electrolave, while the dyeing of carpets in situ by R. G. Dixon & Co. aroused a good deal of attention. A complete range of white spirit clarifiers was shown by Alpha Laval. Two types of electrically-operated machines for repairing stockings were demonstrated by Vitos and Dorothy Dean.

Television in Berlin

British television equipment has been flown to Berlin for a demonstration which the radio industry is giving there, with B.B.C. co-operation, in the Industries Fair now in progress. The demonstration is on the lines of the one given in the British Exhibition in Copenhagen in 1948. Pye, Ltd., have sent cameras and other studio equipment and a transmitter, which operate on a closed circuit, and their engineers are responsible for the presentation of the picture in receivers supplied by themselves and seven other British manufacturers (Bush, Cole, Cossor, G.E.C., Marconiphone, Murphy and Ultra). The B.B.C. has sent a producer, Mr. E. Fawcett, and some studio personnel, and is also exhibiting publications.

N.P.L. Annual Report

Details of the work of the National Physical Laboratory, which ranges from the testing of field glasses to the construction of advanced types of electronic calculating machines, are given in the Annual Report for the year 1949. This report has now been published for the Department of Scientific and Industrial Research by H.M. Stationery Office, price 1s 9d (45 cents in U.S.A.), by post 1s 11d. It is divided into reports from each of the divisions of the Laboratory.

Zinc Prices Revised

The Ministry of Supply announces that from 1st October, the prices of zinc sold by the Ministry is as follows (per long ton delivered buyers' premises) :—G.O.B. Prime Western and debased, £151; refined and electrolytic, £155; not less than 99.99 per cent purity, £157. Zinc oxide prices have also been revised.

Batti-Wallahs' Society

The prospect of hearing something of the work of the European Assembly attracted a large gathering at the monthly luncheon of the Batti-Wallahs' Society which was held on 27th September at the Connaught Rooms, London, Sir David Maxwell Fyfe being the guest of honour. Sir David chose as his subject the Second European Congress, and he gave his impressions of many well-known men of all parties from various countries who attended the Congress. The next luncheon of the Society is on 25th October when an address will be given by Lord Citrine.

Cable Makers and Load Spreading

The Joint Industrial Council for the Electrical Cable Making Industry has decided that the terms of the agreement for spreading industrial electrical load for the winter months of 1947-48 shall be extended to apply to the winter months of 1950-51.

E.D.A. Public Speaking Competition

Details of the 1951 E.D.A. Public Speaking Competition are now available. The subjects set for the competitors' choice are "Leisure Hours," "Safety," "Artificial Illumination" and "Electricity and Transport." Entrants can speak on any of these subjects for 15 minutes. This year the age limit has been raised and members of the staffs of Electricity Boards, the North of Scotland Hydro-Electric Board and E.D.A. members in Northern Ireland, who have not reached their

36th birthday on 31st March, 1951, are eligible. The competition is held in two sections, for men and women. In each section two prizes of £5 and £3, are also given. First-prize winners will represent their areas in the national finals. The award for the winners of the finals is a year's custody of the Faraday silver challenge shields, and inscribed silver plaques which become their personal property. A booklet containing the rules and a booklet entitled " Hints on Public Speaking " can be obtained from E.D.A., 2, Savoy Hill, London, W.C.2.

Lighting Equipment Association

The first general meeting of the National Association of Manufacturers of Electrical Lighting and Allied Equipment was held at the Euston Hotel, London, on 26th September. Twenty manufacturing firms were represented and the formation of the Association was confirmed and its constitution approved. Mr. A. S. Shier, of Thorn Electrical Industries, was appointed chairman for the first year. The administrative secretary is Mr. F. E. Lang, 145, Palace Chambers, Westminster, S.W.1. (telephone : Whitehall 8972).

B.T.H. Works Visit

Mr. Anthony Eden visited the B.T.H. Rugby Works on 29th September. With him were the Rt. Hon. Oliver Lyttelton (chairman, A.E.I.), Dr. H. W. H. Warren (managing director, A.E.I.), Mr. E. V. Small (managing director, B.T.H. Export Co.) and Wing-Commander N. J. Hulbert (director, B.T.H. Export Co.). After lunch in the B.T.H. restaurant with directors the visitors toured the works accompanied by Mr. E. H. Ball (managing director), Mr. W. W. Vinsen (director of manufacture), Mr. H. L. Satchell (director and manager, Rugby Works), and Mr. H. Dreghorn (general superintendent, Rugby Works). They then proceeded to Coton House, the B.T.H. Apprentice Hostel. In the evening Mr. Eden was the guest of honour at the annual dinner of the B.T.H. Overseas Association.

B.S.I. Manchester Branch

The British Standards Institution has opened a branch office at 12, Hilton Street, Manchester, 1 (telephone: Central 4856; telegrams: Bristandin, Manchester). At this office a complete set of British Standards may be consulted and copies purchased if desired. Mr. A. F. B. Nall, an assistant technical director of the Institution, is in charge.

Brewers' Exhibition

A profusion of bottle and cask washing and filling machines, labellers, refrigeration equipment, conveyors and escalators, box making plant, instruments, etc.—all requiring electricity to operate them—rendered the Brewers' Exhibition held at Olympia, London, last week of particular interest. Equipment for every size of establishment was represented, from apparatus designed to wash single bottles to automatic pasteurizers dealing with up to 1,000 dozen bottles per hour and from small domestic type refrigerators used in the small public house to compressors installed in the largest breweries.

A new 2½ gross bottled beer cooler, a beer cellar and a soda fountain were notable Frigidaire exhibits, and beer cooling cabinets of various types were also to be seen on the stands of J. & E. Hall, Ltd., the Pressed Steel Co., Ltd., and L. Sterne & Co., Ltd., the last-mentioned company demonstrating its " Sternette Frostoff " de-frosting system. Forced

Mr. Anthony Eden at the B.T.H. Works

Front Row (left to right) : Mr. W. W. Vinsen, Mr. Oliver Lyttelton, Mr. Anthony Eden, Dr. H. W. H. Warren, Mr. E. H. Ball, Wing-Commander N. J. Hulbert. Second Row (left to right) : Mr. H. Dreghorn, Mr. E. V. Small, Mr. H. L. Satchell

draught coolers accompanied Lightfoot beverage cooling and frozen food cabinets.

A malting demonstration employing electrically-operated plant was staged jointly by Arthur Guinness Sons & Co., Ltd., Robert Boby, Ltd., and Thermotank, Ltd. Moisture measuring and pH determination instruments were shown by Marconi Instruments, Ltd., and various other instruments used in breweries were displayed by Negretti & Zambra, Ltd. An ingenious device demonstrated by the Moreton Engineering Co., Ltd., washes, sterilizes, dries and polishes glasses in a few seconds with cold water.

Steel Conduits Conference

The Association of Steel Conduit Manufacturers held its annual conference at the Imperial Hotel, Llandudno, from 22nd to 25th September, under the chairmanship of Mr. J. M. Surrall, Simplex Electric Co., Ltd. After the members had completed the business items of the programme they were joined by their ladies in an enjoyable round of social events which included coach tours, dancing and a visit to " The Arcadians."

Falcon Association

On 29th September, the first official re-union of ex-student apprentices of the Brush Electrical Engineering Co., Ltd., was held at Loughborough to confirm and establish the Falcon Association inaugurated during the past year. The party which numbered 120 comprised distinguished visitors from outside, representatives of the company's management executives, ex-apprentices who have taken up positions with other companies, and representatives of present apprentice members. Mr. J. H. R. Nixon, chairman of the Association, welcomed the visitors and after a tour of the works and tea in the works canteen, the Association's first annual general meeting was held. The meeting was followed by a dinner at the Grand Hotel, Leicester, under the chairmanship of Mr. J. W. C. Milligan who welcomed the guests.

Trade Announcements

The London Electric Wire Co. and Smiths, Ltd., and its associates, Frederick Smith & Co., the Liverpool Electric Cable Co., Ltd., and Vactite Wire Co., Ltd., have removed their Brighton sub-branch office and stores to 41, Market Street, Brighton. The telephone number is unaltered.

Mr. D. Jackson has been appointed a representative of the **Bowthorpe Electric Co., Ltd.**, and will cover North and South London, Sussex, Surrey, Shropshire, Staffordshire, Worcestershire, Warwickshire, Leicestershire and Northampton. Mr. T. J. Smith will represent the company in South-East and Central London, Hertfordshire, Kent, Essex, Derbyshire, Nottinghamshire, Lincolnshire, Norfolk, Cambridgeshire, Huntingdon, Bedfordshire and Suffolk.

Heenan & Froude, Ltd., have taken over the designs, drawings, patterns, jigs, etc., of the range of automatic machines for the wire and strip industry hitherto made by A. W. Macnamara, Ltd. They have appointed A. C. Wickman, Ltd., Banner Lane, Coventry, as sole selling agents throughout the world.

Metway Electrical Industries, Ltd., have appointed Messrs. R. Barker and F. Richardson as representatives for the Midland area.

Mr. G. Johnson, 57, Keswick Road, Sheldon, Birmingham, 26, has been appointed by the **Arora Company** as representative in the Birmingham and West Midlands area.

Mr. G. Law, until recently with Ekco-Ensign Electric, Ltd., has joined the Lighting Division of **Herman Smith, Ltd.**, and will cover the East and West Ridings of Yorkshire working from his residence, South View, Clayton West, Huddersfield (telephone : Skelmanthorpe 3162).

Mr. R. W. Gaunt has been appointed representative for **Ekco-Ensign Electric, Ltd.**, for part of the Manchester and Salford area. He will be based at the company's Preston office.

Catalogues and Lists

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester, 17.—Thirteen technical publications dealing with mechanical handling equipment, transformers, switchgear, instruments and industrial heating elements.

Dewhurst & Partners, Ltd., Inverness Works, Hounslow, Middlesex.—Leaflet describing a miniature geared limit switch with micro-setting for control circuits.

Siemens Electric Lamps and Supplies, Ltd., 38-39, Upper Thames Street, London, E.C.4.—Catalogue and price list of fluorescent lighting fittings and equipment.

Hume Atkins & Co., Ltd., 66, Victoria Street, London, S.W.1.—Priced catalogue of commercial lighting fittings and convector heaters.

Elexcel Ltd., Victor Works, Broadgreen, Liverpool, 14.—Priced catalogue of domestic appliances.

Barries Electrical Agencies, Ltd., King Street, Brighton, 1, Sussex.—Priced folder on push button direct-on-line starters.

G. & J. Weir, Ltd., Cathcart, Glasgow, S.4.—Brochure (No. 151) on evaporating and distilling plants.

World Power Conference

New Year Sectional Meeting in India

THE second post-war sectional meeting of the World Power Conference will take place at New Delhi in India from the 10th to 15th January, 1951.

The first list of delegates from Britain contains seventeen names, including those of Sir Vincent de Ferranti (chairman of the International Executive Council and of the British National Committee) and of Lord Citrine (chairman, B.E.A.) while eight manufacturers are represented.

Eight British papers are to be presented on the following subjects:—

Considerations affecting the planning of electricity supply for irrigation and other rural loads, by F. H. Sharpe and E. L. E. Wheatcroft (Messrs. Merz and McLellan); the utilization of electricity in agriculture and in agricultural processing, by C. A. Cameron-Brown (B.E.A.); electricity and fertilizers, by H. S. Coles and E. C. Fairhead (I.C.I.); the co-ordination of power supply for railway electrification and other purposes, by the late F. Lydall and C. M. Cock (English Electric Co.); power in coal mines, by B. L. Metcalf (N.C.B.); power load planning and national economy, by R. Y. Sanders (B.E.A.); the development of national power resources in relation to industrial and other needs, by G. R. Peterson (B.E.A., overseas liaison); and the organization of research into power generation and utilization, by Sir Arthur P. M. Fleming (Metropolitan-Vickers Co., sponsored by B.E.A.M.A.).

The fourth Congress on Large Dams is to be held at the same place and time. Six British participants will represent consulting engineering firms, the D.S.I.R. and the B.E.A. Seven papers will deal with the following subjects:—Flood discharge, by J. K. Hunter and J. F. Wilmot; round-crest, syphon and trumpet shaft spillways, by J. Williamson; design and construction of earth dams, core walls and diaphragms of earth and rock-fill dams, by E. C. Steer and G. M. Binnie; sedimentation, transportation and deposition of solid materials by flowing and evaporating water, by Sir Cyril S. Fox; creep and shrinkage in restrained concrete, by C. R. Lee; cement variations as affecting cracking in large dams, by C. M. Roberts; and concrete for large dams, by Brig. G. B. Hull.

Study tours before and after the two conferences will extend from the Malikpore hydraulic research station in the extreme north of India to Bangalore, Mysore and the Mettur dam in the south. The closing sessions will take place at Mysore on 1st February, 1951. Concurrently an Indian International Engineering Exhibition will be staged at New Delhi (January–February) and U.K. exhibitors will include the B.E.A., North of Scotland Hydro-electric Board and a number of manufacturers of electrical plant and equipment.

Management in Industry

ORGANIZATION and management were dealt with by Mr. J. Eccles (chairman, Merseyside and North Wales Electricity Board) in his inaugural address as chairman of the Mersey and North Wales Centre (Liverpool) of the Institution of Electrical Engineers. He said that experience seemed to show that successful management operated in three closely related sections. Overall control was usually exercised by a central board of directors, who collectively accepted ultimate responsibility, integrated operational and functional interests and planned forward policy on broad lines. Since business enterprise was dynamic, the pattern of overall control in any business must change to meet the needs of a changing situation.

The means whereby overall control was translated into executive action were, first, operational management, the control of that part of the business which was directly responsible for production and sale. The correct size defied direct definition, but it should be sufficiently small for one man to comprehend the whole of its activities, take a personal responsibility for them and be immediately accessible so that prompt decisions could be made.

Secondly, there was functional management of a team of specialists operating from the centre whose duties were, each in his own sphere, to bring the most appropriate ideas to the notice of operational management and to see that they were brought into use uniformly throughout the various works. An essential duty of functional management was to improve the quality of method and of the product.

Functional management was essentially a centralized service and operational management a decentralized service, the concrete and reinforcement of which the business structure was built. They had complementary parts to play and their strength lay in the proper use of their respective properties in intimate association.

Electrical Machine Control

Vacation School at Imperial College, London

A VACATION school on the control of electrical machines which was held recently in the Electrical Engineering Department of the Imperial College, London, was attended by some sixty engineers, drawn from industry, research associations, the universities and technical colleges.

Under the chairmanship of Prof. Willis Jackson (Imperial College) an opening address was given by Mr. W. M. Couch (Admiralty) who referred to the rapid developments being made in electrical engineering and the need for exchange of ideas. The increasing use of automatic control equipment would aid productivity and the study of the common basis of the many techniques in use was very opportune.

In the first lecture, Mr. B. Adkins (B.T.H. Co.) discussed the general principles of the subject, giving illustrations of open-loop and closed-loop systems and outlining the mathematical techniques employed in their analysis. During the discussion the need for improved nomenclature was voiced and the respective spheres of application of the Laplace transform and Heaviside's operational calculus were also examined.

In the next lecture Mr. M. W. Humphrey Davies (Imperial College) described the action and properties of the several forms of two-stage machines used in rotating amplifiers. In the ensuing discussion attention was drawn to the proportionality between the inherent time constant and power amplification in these machines.

Magnetic and Electronic Amplifiers

Mr. D. Wray (English Electric Co.) spoke next on magnetic amplifiers, giving the outline theory of their action and a review of their principal applications. Their use in push-pull, and dependence on supply voltage, were later discussed.

Lecturing on electronic amplifiers, Dr. W. G. Thompson (G.E.C.) showed how grid control of thyratrons or mercury-arc rectifiers would give flexible control schemes. The advantages and disadvantages of electronic methods were compared, and discussion continued on the different techniques needed with electronic devices and the need for special training of maintenance staff.

Mr. E. P. Hill (Metropolitan-Vickers) then discussed large d.c. machines, their design limitations and the controls which could be coupled without external amplifiers. The effects of iron paths and coupled circuits on time constants were treated in the discussion.

Mr. A. A. L. Bentall (Metropolitan-Vickers) followed, illustrating the control of d.c. machines in various combinations with a wide selection of industrial applications. The flexibility of these machines was emphasized and invoked a very informative discussion on their industrial uses.

Mr. A. Asbury (English Electric Co.) dealt with the control of a.c. machines, outlining the methods of controlling large induction and synchronous motors which find particular application where the largest powers are required. Questions of dynamic braking and unbalanced voltage control were raised in the discussion, during which the smaller a.c. machines also received consideration.

Applications Inspected

During a visit to the Kemsley Paper Mill of the Bowater-Lloyd Pulp and Paper Mills, Ltd., examples of the control of electrical machinery were described and illustrated by Mr. A. C. G. Witts and his colleagues of the Bowater organization. The automatic control schemes for paper machines and wood grinders were of particular interest.

The school was aptly concluded by the last two speakers. Mr. W. Spence (B.T.H. Co.) gave a summary of the methods of combining control apparatus into a complete closed-loop control system and of assessing the resulting performance. The discussion emphasized the necessity for close collaboration between machine designers, control engineers and users. Mr. A. Asbury dealt with the calculation and measurement of the constants of electrical machines and methods for testing a complete control cycle. It was clear from the examples quoted in the discussion that calculated and measured constants were frequently at variance, and methods for reducing these discrepancies were suggested.

The general impression gained from the whole course was that rapid progress was being made in the design of control systems and in the appraisal of the relative merits of different schemes. There was still, however, a need for better appreciation by users of the importance of specifying their performance requirements as precisely as possible, and for not asking for a closer control than was necessary if they required an economical system.

ELECTRICITY SUPPLY

Power Plant Contracts

Extension of Fleetwood Station

DURING the past month the British Electricity Authority has placed contracts for equipment for power stations, switching and transforming stations and transmission lines amounting in the aggregate to £2,926,477. The principal contracts are as follows:—Bankside: First half of superstructure.—Sir Robert McAlpine & Sons, Ltd. Brighton "B": Cable tunnel.—Balfour Beatty & Co., Ltd. Carrington, near Manchester: Superstructure.—W. & J. R. Watson, Ltd. Low pressure pipework.—Stewarts & Lloyds, Ltd. Chadderton, Oldham, Lancs: Foundations to ancillary buildings.—M. J. Gleeson, Ltd. Roosecote, Barrow-in-Furness: Main foundations and ancillary works.—J. Gerrard & Sons, Ltd. Condensing and feed heating plants for two 30,000 kW sets.—Vickers-Armstrongs, Ltd. 132 kV transformers. — Metropolitan-Vickers Electrical Co., Ltd. Bold, near St. Helens, Lancs: Condensing and feed heating plants for two 30,000 kW sets.—Vickers-Armstrongs, Ltd. Fleetwood, Lancs: Condensing, feed heating and de-aerating plant for one 30,000 kW set.—Vickers-Armstrongs, Ltd. Carmarthen Bay, South Wales: 132 kV 2,500 MVA switchgear.—Ferguson, Pailin, Ltd. 132 kV overhead line at Stoke-on-Trent.—British Insulated Callender's Construction Co., Ltd.

Fleetwood Power Station

The Minister of Fuel and Power has consented to the development of Fleetwood power station, Lancs, to its full capacity. Authorization was given last June to the establishment of this station and the installation of a 30,000 kW turbo-alternator and a 300,000lb/hr boiler unit, and the construction of a cooling tower. The new consent covers the installation of five more 30,000 kW sets and five 300,000lb/hr boilers, with two further cooling towers. When completed the total installed capacity of the station will be 180,000 kW.

Rural Policy

A statement by Mr. C. R. King, chairman of the East Midlands Electricity Board, detailing the Board's rural development policy was submitted to the Consultative Council for the area at its meeting on 27th September. Mr. King indicated that the Board proposed to allocate amounts for its capital expenditure budget sufficient to complete the provision of supplies to every village and hamlet and all but the most isolated farms during the next ten years, subject to any limitations on capital expenditure imposed by the Government. This was to be done as far as possible without asking for capital contributions from consumers other than the normal service charges where individual properties were some distance from the mains. In all cases the alternative of a guaranteed minimum consumption would be offered. In the near future it was proposed to introduce a standard domestic tariff, followed by a standard farm tariff.

Standard Domestic Tariff

The North Western Electricity Board has issued a statement setting out its proposals for the introduction of a standard domestic tariff. The existing two-part and flat rate tariffs are to be replaced by one of the "block" type under which the number of kWh at the higher rate will be based on the number of chargeable rooms in consumers' premises. For this purpose such rooms as bathrooms, coal stores, washhouses, pantries, landings, garages and greenhouses are excluded. To obtain the necessary information the Board proposes to ask the consumers to co-operate by entering the necessary information on reply-paid postcards which will be sent out with accounts.

Bakerloo Extension Postponed

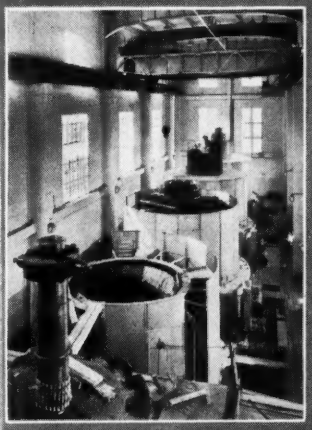
In view of the substantial increase in the cost of the proposed extension of the Bakerloo Tube from the Elephant and Castle to Camberwell it has been decided to postpone the scheme until conditions are more favourable. The total cost of the extension, which is only 1¼ miles in length, including the additional rolling stock and depot accommodation, is now put at no less than £6¼ million.

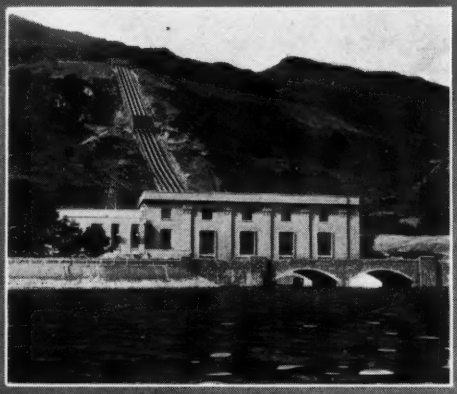
Belfast Trolley-buses

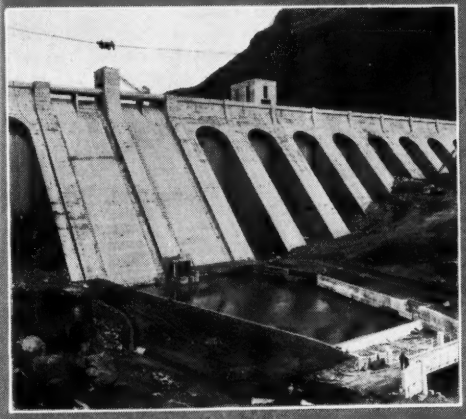
An extension of the Belfast trolley-bus service from the city centre to Greencastle, on the Shore Road, recently came into operation, replacing the trams. The Crumlin Road route, one of the most congested in the city, will be dealt with next.

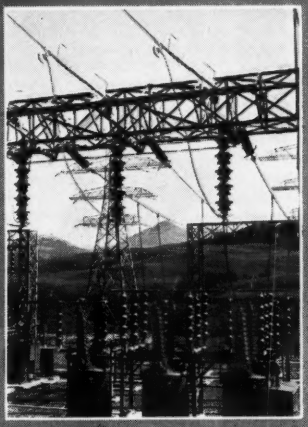
Trolley-buses in Canada

The first trolley-coach service in Hamilton, Ontario, is expected to be started this month. Present plans are for the operation eventually of a fleet of about a hundred of these vehicles.









SCOTTISH POWER SCHEME

Views of the North of Scotland Hydro-Electric Board's Loch Sloy scheme, which is to be officially inaugurated by Her Majesty the Queen next Wednesday

(see "Electrical Review" 10th June 1949, 10th & 24th March 1950)

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends.

General Electric Co., Ltd.—At the annual meeting on 28th September, Sir Harry Railing (chairman) made a comprehensive survey of the company's activities during the past year and expressed his views on some of the vital problems facing the nation. Sir Harry said that the only way in which we could meet the increase in expenditure on defence was by increasing total national production. We must also have the best tools : they were indispensable and must precede and not follow the results. It was incomprehensible that capital set aside for this purpose should be taxed. Instead of imposing penalties, inducements should be offered to companies or subscribers who saved in order to facilitate this investment essential for the production of additional national assets, just as inducements should be offered to the men who worked harder for this same purpose. We could not afford to grant unrealistic wages demands. Limits to social aspirations were imposed by hard economic facts, and by the scarcity of the means and resources available. He was confident that given a realistic appreciation of the situation, the country would respond to any new clear call both for national and economic defence.

The London Electrical & General Trust, Ltd.—Revenue for the year to 30th June last £67,304 (£63,607 for 1948-9). Net balance £25,645 (against £23,504). Dividend 7 per cent (6 per cent). Carried forward £19,580 (£18,570 brought in).

Crossley Brothers, Ltd.—Consolidated trading profit for year to 30th April last £465,832 (£436,772 for preceding year). Net profit £195,238 (against £164,046). Dividend on deferred ordinary 15 per cent (against 12½ per cent). Carried forward £240,832 (£174,419 brought in).

Sturtevant Engineering Co., Ltd.—At an extraordinary meeting held on 28th September, approval was given to the capitalization of £49,314 from general reserve for the issue of 197,256 5s shares on the basis of one for five.

Bennis Combustion, Ltd.—Group trading profit for year ended 30th April last, after all charges, including taxation, £24,586 (against £68,420 for preceding year). United Kingdom taxation £29,131. Final dividend 10 per cent, making 15 per cent for the year (unchanged).

Telegraph Condenser Co., Ltd.—Interim dividend 5 per cent (unchanged).

Thos. W. Ward, Ltd.—Final dividend 10 per cent, making 15 per cent for the year (same).

Ericsson Telephones, Ltd.—Interim dividend 5 per cent, tax free (same).

Metropolitan Electric Cable & Construction Co., Ltd.—Interim dividend 10 per cent (same).

Solus Teoranta (Irish lamp making concern).—Final dividend 5 per cent making 10 per cent for year (unchanged).

Strand Electric & Engineering Co., Ltd.—Gross consolidated trading profit to 30th April £235,833 (against £196,160 for preceding year). Net profit £25,214 (£15,930). Dividend 17½ per cent (unchanged).

Babcock & Wilcox, Ltd.—Interim dividend of 5 per cent (same).

Ever Ready Trust, Ltd.—Interim on ordinary and deferred of 5 per cent (same).

A. H. Hunt, Ltd.—Interim of 7½ per cent (unchanged).

Lightalloys, Ltd.—Final dividend of 9d per share (6d per share) making 1s per share for the year (9d).

Increases of Capital.

Mullard Wireless (Near East), Ltd.—Increased by £20,000, in £1 ordinary shares, beyond the registered capital of £5,000.

Prentice, Ltd.—Increased by £25,000, in £1 ordinary shares, beyond the registered capital of £15,000.

Telephone Rentals, Ltd.—Increased by £500,000, in 2,000,000 ordinary shares of 5s, beyond the registered capital of £1,500,000.

Bankruptcies.

J. S. Anderson, trading as Electronic Services, at Nearavon, Salisbury Street, Fordingbridge, Hants., radio and electrical engineer.—Receiving order made 26th September on debtor's own petition.

E. Cheetham, formerly carrying on business at 377, Ashton Old Road, Manchester, as an electrical contractor.—First and final dividend of 1s 3d in the £, payable 13th October at the Official Receiver's office, 20, Byrom Street, Manchester, 3.

Liquidation.

The Madras Electric Supply Corporation, Ltd.—Special resolution. Winding up voluntarily. Liquidators, Messrs. D. E. Webb and C. R. Akers, 1, Queen Victoria Street, London, E.C.4.

FINANCIAL SECTION

STOCKS and SHARES

THE outstanding feature in Stock Exchange markets is the steadiness of prices in most parts of the House. Moreover, business is decidedly more active than it was a few weeks ago, and the voice of the buyer is again heard in the land. Removal of the previous restriction which prohibited overseas holders of stocks and shares from exchanging into anything but Government securities, had the effect of releasing tolerably large sums of money and these are seeking employment in investment, as well as in the speculative sections. British Electricity and London Transport stocks continue to be a good market, and several new issues of the best type have secured pronounced success.

Rising Prices

Since a fortnight ago, about thirty prices of shares in companies with which we deal, have improved. Most of the advances are modest, but they go against a mere handful of falls. The latter include Anglo-American preferred at 87½, Cape Electric Trams 13s 9d, E. K. Cole 17s 6d, E.M.I. 22s 6d, Mather & Platt 39s 6d. The rises are distributed over practically every section; electric lighting, equipment, manufacturing, radio, telephone and electricity issues generally. In the first-named group, Perak advanced to 11s on the news from Korea. The Indian shares are good, Cawnpore, particularly, at 60s—on " break-up " estimates.

Investment Demand

B.I. Callender's 33s, Crompton 12s 6d, Electric Construction 58s 9d, Every Ready 29s 6d, English Electric and Ericssons, both 47s 6d, Johnson & Phillips 61s 3d, London Electric 51s 3d, Telegraph Construction 39s, are amongst those which have risen during the past fortnight on investment demand. British Thermostat are a good market at 32s 6d. Hoover recovered to 46s 9d, Automatic Telephone at 60s and Oriental Telephones at 46s 3d have both advanced; in lower-priced shares, Newman Industries strengthened to 4s. Allen West 10s 3d, and Hall Telephone 15s are also better. J. & F. Stone rose to 19s 9d, Sterling Electric Industries 6½ per cent preference to 15s 9d.

G.E.C.

The speech of the chairman at the General Electric meeting gave considerable satisfaction in the Stock Exchange market. Sir Harry Railing thrust home truths at the Government, to whom he gave a serious warning in regard to the outlook for industry under the present conditions. The price of the shares keeps firm at 82s ex dividend. Optimism read into the chairman's speech a very vague hint as to the possibility of an increase in the dividend, later on, little as the Margate Conference did to fan the hope of dividends being raised in to-day's conditions.

Lancashire Dynamo

A movement worth recording is the persistent advance in the price of Lancashire Dynamo & Crypto £1 shares. It is now within ⅛ of the £5 mark. The price was little more than 90s when quoted " ex-rights " to the offer of new shares early in August. These were offered to shareholders at £4 per share, and the subsequent course of events indicates that investment is ready and willing enough to subscribe new capital in the form of ordinary shares where the terms and conditions are attractive. Lancashire Dynamo shares now return 4½ per cent on the money.

J. Lucas and Tube Investments

Both these companies ended their financial years in July. Last time, the final dividends and preliminary figures appeared within a few days of each other in mid-November. That good figures are expected from the coming results is evident from the present quotation of both shares—Lucas at 33s 3d and " Tubes " at £6⅜—on a yield basis of less than 4 per cent. Lucas paid for 1948–9 the equivalent of just over 5¾ per cent on the present capital (after the 200 per cent bonus) from earnings equal to some 38 per cent. The interim distribution was maintained in March and the company has stated that future dividends will be decided by reference to trade conditions, and to official policy on wages and profits. Tube Investments last paid a 25 per cent dividend from earnings of over 100 per cent.

Lines on Offer

Although the price of the shares has lately risen by 1s or so, the yield of £4 17s 6d per cent from Hackbridge & Hewittic 5s ordinary deserves attention, the shares being available at the moment in fairly large numbers at 15s 4½d. The 15 per cent dividend was covered about three times by the last earnings, and the balance sheet showed a good liquid position. International Combustion 5s shares are also in comparatively free supply at 17s. The yield is close on 4½ per cent, on the basis of a similarly well covered 15 per cent dividend, as adjusted for the capital bonus but without allowing for the increase in this year's interim distribution. Lodge Plugs 5s ordinary have been in good demand since the annual report appeared last month, but can be bought at 28s 6d to pay just over 6 per cent on the money.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses

Anglesey.—23rd October. County Council. Electrical installation in new County Primary School, Beaumaris. (See 6th October issue).

Australia.—VICTORIA.—25th October. State Electricity Commission. Electrically driven aerial ropeway. (See this issue.)

QUEENSLAND.—6th December.—State Electricity Board. Erection of a 66 kV transmission line between Maryborough and Kingaroy. (C.R.E. (I.B.) 65517/50. Ten/1685.)*

21st December. City Electric Light Co., Ltd., Brisbane, 44 kV outdoor type circuit breakers (Tender No. 50/26). (C.R.E. (I.B.) 66325/50. Ten/1710.)*

BRISBANE.—8th November. State Electricity Commission of Queensland. Copper cable. (C.R.E. (I.B.) 66332/50. Ten/1717.)*

Bromsgrove.—21st October. R.D.C. Two centrifugal pumps with motors, switchgear, etc., for Belbroughton sewerage. Fiddian and Deeley, Council's engineers, 13, Church Street, Stourbridge.

Hastings.—1st November. Corporation. Electrical installation in secondary modern school, Red Lake, Ore. (See this issue.)

Newcastle-upon-Tyne.—4th November. Education Committee. Electrical installation in Montagu primary school. Director of Education.

New Zealand.—30th January, 1951. State Hydro-Electric Board. 11 kV switchgear for Kinleith sub-station. (C.R.E. (I.B.) 65595/50. Ten/1694.)*

Portugal.—18th December. Directorate General of Colonial Development. Dam, power station and sub-station for the Biopio (Angola) hydro-electric scheme, Portugese West Africa. (C.R.E. (I.B.) 62303/50. Ten/1711.)*

Sunderland.—27th October. Corporation. Repairs and extensions to the electrical installation at Burdon Hall. (See this issue.)

Warwick.—27th October. Corporation. Street lighting equipment. (See this issue.)

Wilts.—County Education Committee. Electrical installation in schools. (See this issue.)

ORDERS PLACED

Dundee.—Corporation. Installation of electric lighting, socket outlets, and a power and ventilation installation at Albert Institute (£6,583).—George Smith, Engineers (Dundee), Ltd.

Jarrow-on-Tyne.—Town Council. Electrical installations in block of 84 flats, Albion Street.—J. McCabe.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alvechurch (Birmingham).—New school, staffroom, dining room, etc.; S. T. Walker, 83, Suffolk Street, Birmingham, 1.

Bedford.—Flats (48), Mile Road and Harrowden Road; borough surveyor.

Grain silo for Ministry of Food; C. R. Price, Kingsbury Road, N.W.9.

Bexley.—Houses and flats (74), Royal Park Estate; Ley, Colbeck and Partners, architects, Palmerston House, Bishopsgate, E.C.2.

Birmingham.— Houses (50), Sparkbrook and Longbridge, for Public Works Committee; city engineer, Civic Centre.

Boreham Wood.—Factory; Adhesive Tapes, Ltd., Manor Way.

Carlisle. Additional factory buildings for Carr & Co., Ltd., biscuit manufacturers; John Laing & Son, Ltd., Dalston Road.

Cheltenham.—Paper coating factory, Gloucester Road; Leonard Stace, Ltd., 6, Brunswick Street.

Cork.—Factory for Bantry Bacon Factory, Ltd.; Buchan, Kane and Smith, architects, 73, South Mall, Cork.

Croydon.—Factory, New Addington industrial estate; Exel Mould & Tool Co., Ltd., North Street, Bromley.

Houses (151), New Addington estate; Bunting Construction Co., Ltd., 73 Acre Lane, S.W.2.

Derby.—Factory buildings for Rolls Royce, Ltd.; Ford & Weston, Ltd., Osmaston Road.

Hawes (Yorks).—Cheese factory for the Wensleydale Dairy Products, Ltd., Hawes (£30,000).

London.—HOLBORN.—Reinstatement of premises, Devereux Court (£60,000); Twining & Co., Ltd., tea and coffee merchants, Napier Hall, S.W.1.

CITY.—Distillery (£215,000); Tanqueray Gordon & Co., Ltd., distillers, 132 Goswell Road.

Manchester.—Reinstatement of damaged factory at Oldham Road for J. N. Phillips & Co., Ltd.; J. W. Beaumont & Sons, architects, Danlee Buildings, Spring Gardens, Manchester.

Portsmouth.—Flats (56), Nelson Road area; A. E. Cogswell & Son, architects, Prudential Buildings.

Factory, Fratton industrial estate; R. L. Revnish, Kent Lodge, Queen's Crescent, Southsea.

Slough.—Factory and offices for Johnson & Johnson, Ltd., surgical dressing manufacturers; Slough Estates, Ltd., contractors.

Watford.—Works extensions; Yeatman & Co., Ltd., Cherry Tree Works.

Whitehaven.—Factory for Marchon Products, Ltd.; John Laing & Son, Ltd., Carlisle.